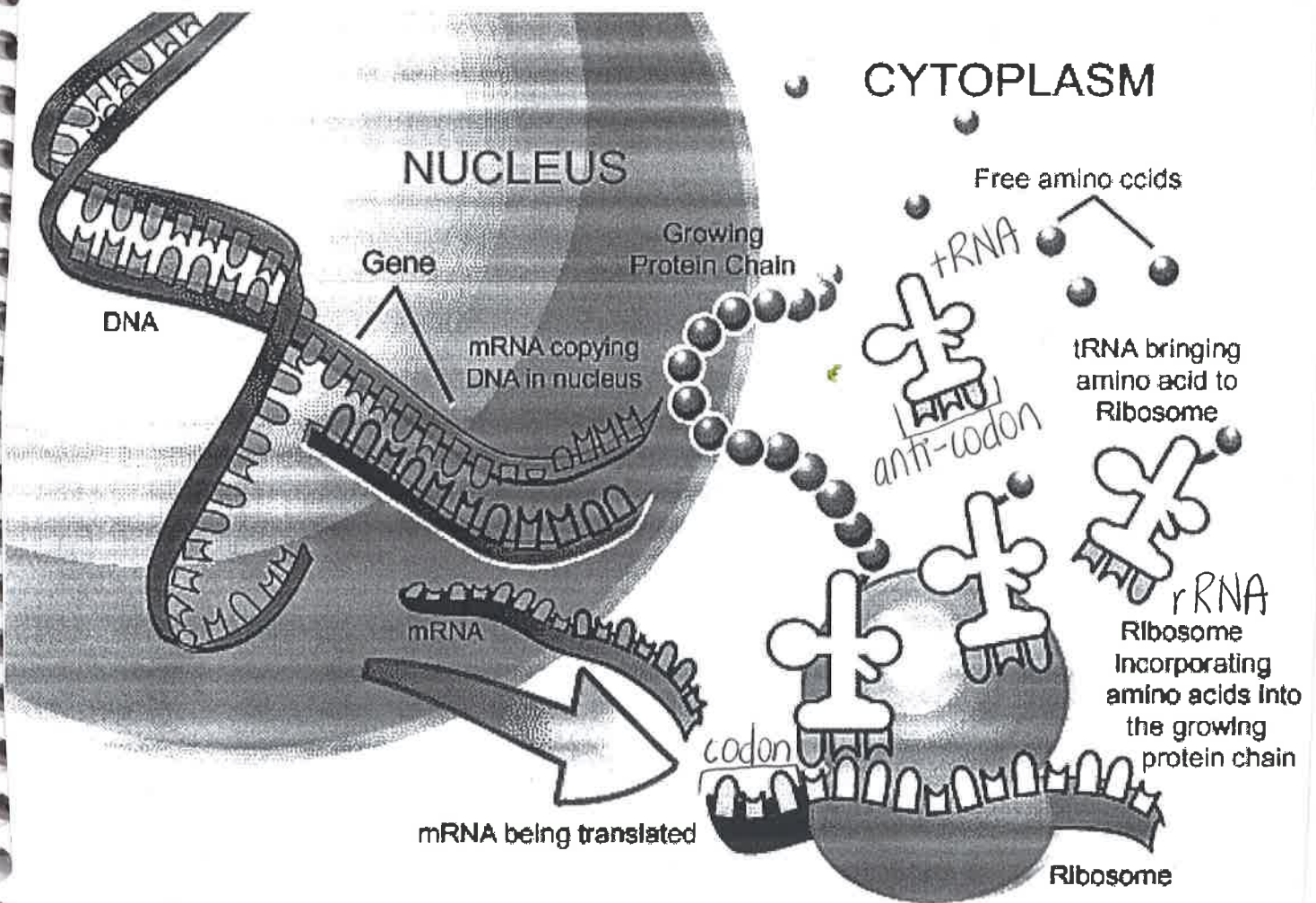


# From gene to protein: transcription + translation. (3)



mRNA Messenger RNA - molecules of RNA that carry copies of DNA instructions from nucleus to cytoplasm

rRNA Ribosomal RNA - subunits of ribosomes are made of ribosomal RNA

tRNA Transfer RNA - carries amino acids from cytoplasm to ribosome and matches them to mRNA codons

**TRANSCRIPTION:** In the nucleus, the cell's machinery copies the gene sequence into messenger RNA (mRNA), a molecule that is similar to DNA. Like DNA, mRNA has four nucleotide bases - but in mRNA, the base uracil (U) replaces thymine (T). *sugars*

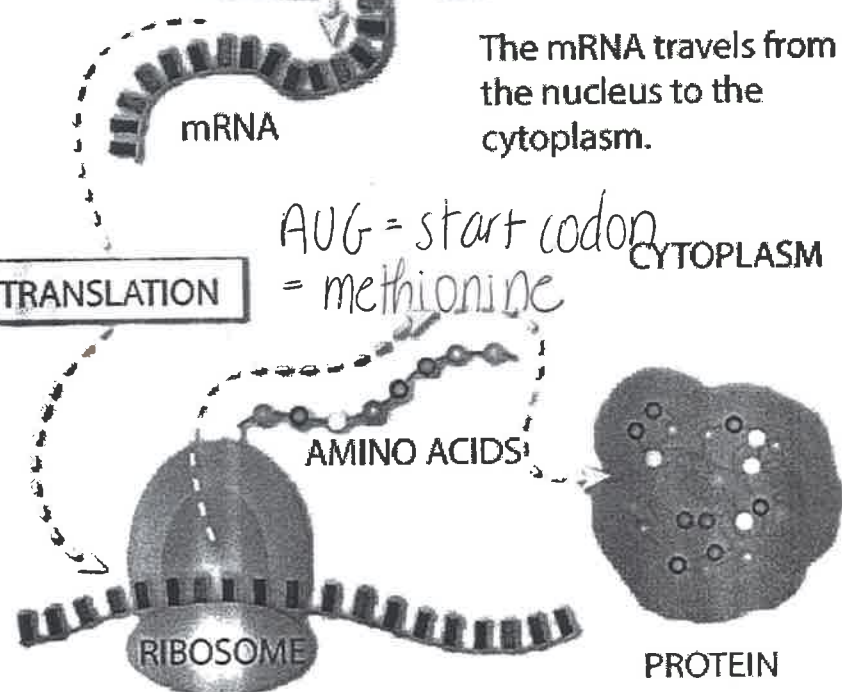
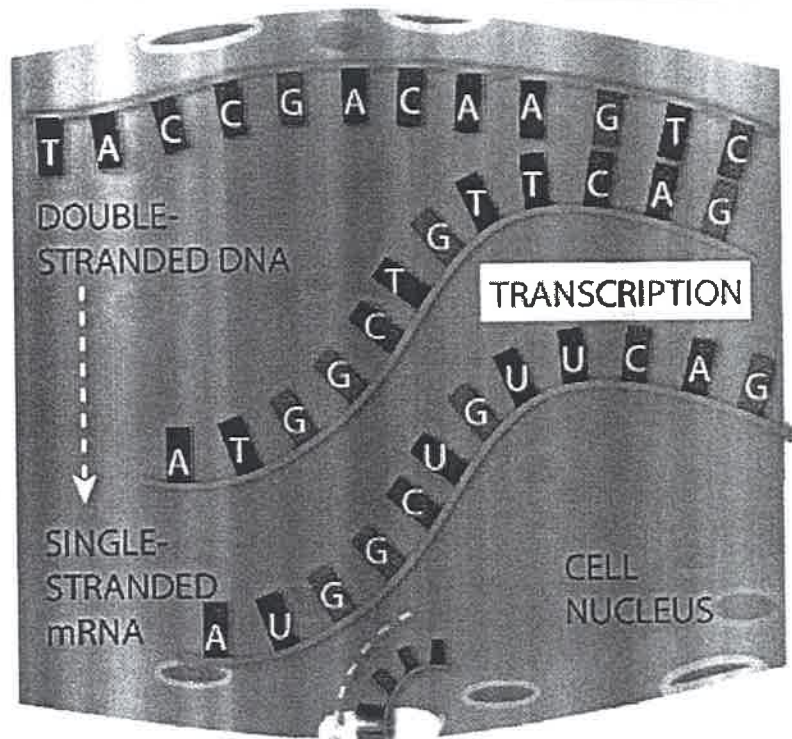
DNA = double stranded + deoxyribose

RNA = single stranded + ribose

DNA: C ≡ G    A = T (thymine)

RNA: C ≡ G    A = U (uracil)

**TRANSLATION:** The protein-making machinery, called the ribosome, reads the mRNA sequence and translates it into the amino acid sequence of the protein. The ribosome starts at the sequence AUG, then reads three nucleotides at a time. Each three-nucleotide codon specifies a particular amino acid. The "stop" codons (UAA, UAG and UGA) tell the ribosome that the protein is complete.



RNA polymerase - enzyme that binds to DNA, separates strands, and uses one strand of DNA as a template to assemble complementary nucleotides in a strand of RNA.

Promoters - regions of DNA that can bind to RNA polymerase

Introns - portions of pre-mRNA that are cut out + discarded.

EXONS - remaining pieces that are spliced back together and form final mRNA

codon - 3 base sequence that specify a single amino acid (mRNA)  
64 possible codons specify 20 different amino acids

anti-codon - 3 base sequence in tRNA that is the complementary base pair of a codon